MEDICAL OFFICERS OF SCHOOLS ASSOCIATION

Remedial Exercises in Schools and School Clinics

BY

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Remedial Exercises in Schools and School Clinics.*

By R. C. ELMSLIE, M.S., F.R.C.S.,
Orthopædic Surgeon to St. Bartholomew's Hospital.

Physical training or physical education includes the development by educational means of all the movements of the parts of the body to their normal extent, the development of the muscles concerned in these movements so that they can act quickly, accurately, and with reasonable strength, and the education of the nervous control of movements so that these can be carried out with delicacy and co-ordinated for all ordinary purposes. It is to be expected that this education will not be equally easy in all children. In some, quite apart from any disability caused by disease, there may be a natural deficiency in the range of movements of one or more joints. In others there may be exceptional muscular weakness; in a third class a slow development or an actual non-development of the nervous control of movement. In addition to such natural defects, the same difficulties may arise as the result of a neglect of physical education in the earlier years; a child who has received no physical training up to the age of ten years will naturally tend to be stiffer, less strong and active, and less accurate in his movements than one who has received such training from the age of seven. In the third place defects of the same sort may arise as the result of actual disease, joints being stiff after some form of inflammation, muscles weak as the result of paralysis, co-ordination difficult as the result of some cerebral defect or disease. Whenever there exist any of these difficulties in carrying out an ordinary system of physical training, the steps taken to remedy the defect may include a special course of exercises or movements, active or passive; such a course will constitute treatment by remedial exercises.

* A paper read before the Medical Officers of Schools Association on June 11th, 1914.

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The defects thus classed as capable of treatment by remedial exercises extend over a very wide range. They include the results of improper or neglected use of the joints and muscles, the evidences of imperfect muscular co-ordination and balance seen in habitual attitudes, and they include also actual fixed deformities. In a sense all physical training is remedial in character, for the muscles in children are naturally at first weak and their co-ordination imperfect, and the result of the training is gradually to develop strength and co-ordination. But such natural development should be classed rather as a normal education than as a therapeutic method. Physical training has also the effect of improving the general health of the child, of improving the circulation and of strengthening the heart. Although exercises definitely used for these last-named purposes are truly remedial in nature, I do not propose to deal with them upon this occasion, for they introduce an additional complication in what is already a sufficiently large subject, and to a great extent fall within the province of the physician rather than that of the surgeon.

If I were to attempt to define, then, the children for whom remedial exercises are necessary, I should include all those who—

(1) Are unable to hold themselves habitually in a proper erect and symmetrical attitude.

(2) Are unable to carry out all movements to their normal extent.

(3) Have not a reasonable degree of strength and quickness, or—

(4) Lack proper power of control and co-ordination of their movements.

Such a definition is, however, of no value until the proviso is added that in estimating these defects comparison must be made with an average child of the same age who has had a reasonable amount of physical training.

It will thus be seen that there is no hard and fast line, the class of children who merely do exercises badly merges into that of children with habitual bad postures, and the latter into that of children with fixed deformities. It will simplify matters if I choose a particular defect, and illustrate by means of it the possibilities and limitations of remedial exercises in schools. For this purpose kyphosis is a specially suitable subject, for it is common, variable in degree, complicated in its nature and treatment, and important in its results.

By kyphosis is meant an increase in the length or in the

degree of the normal backward convexity of the dorsal region of the spine. This deformity may be habitual, in which case it is correctable by the action of the child's own muscles, or disappears completely in certain attitudes, *e.g.* in the recumbent position, or else fixed, in which case the deformity will only disappear as the result of the application of some externally applied force, and it may even be so fixed that no such force applied up to the limit of the patient's endurance will cause the deformity to disappear.

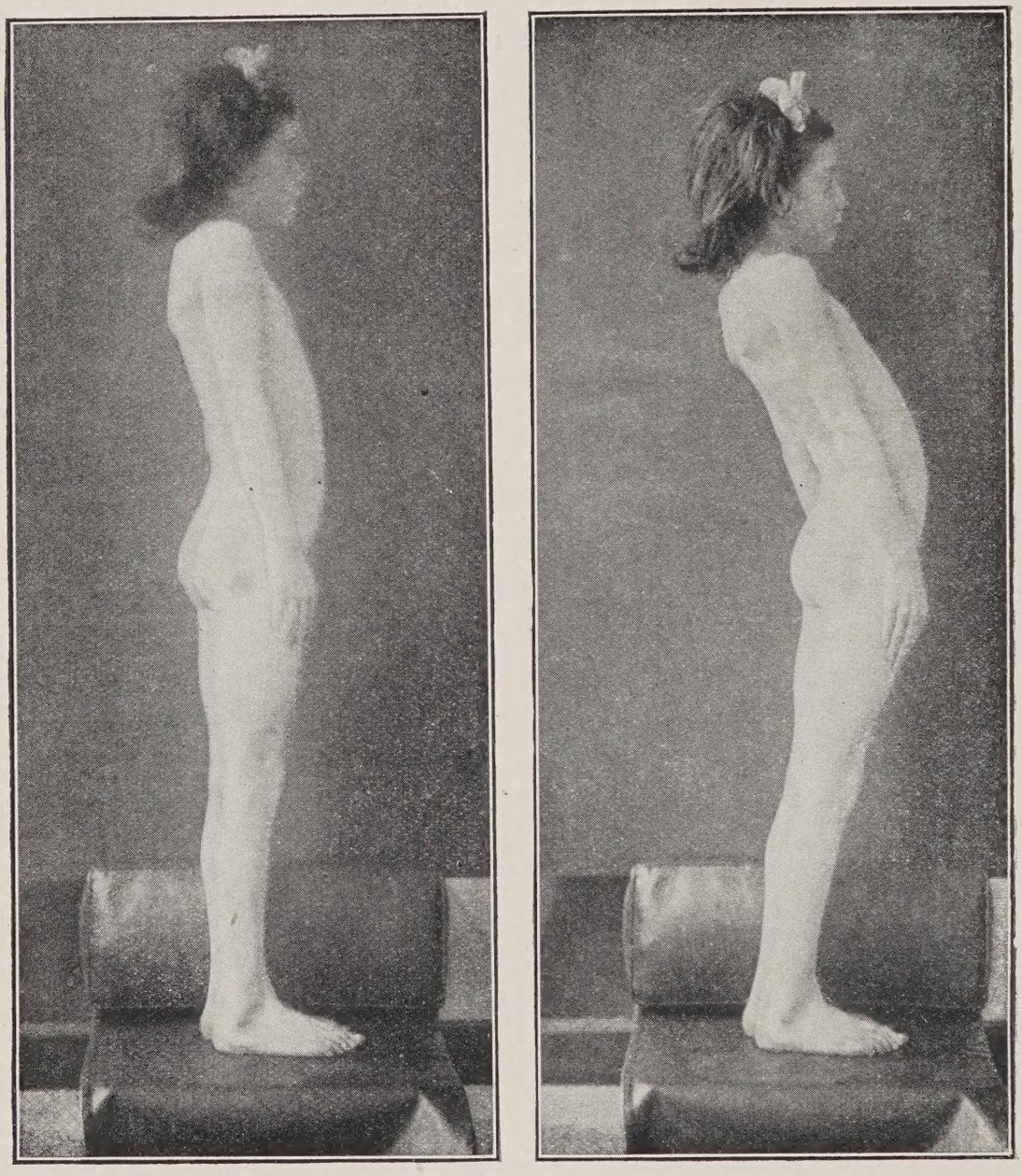
Kyphosis is not by any means a simple deformity, in addition to the alteration in the contour of the spine, the posture of the head is changed, the chest is altered in shape, in capacity, and in its range of expansion, and the movements of the shoulder-joints and scapulæ are often restricted. The head is poked forward, the chest is flat, and its range of expansion diminished, at the shoulder external rotation, abduction, and direct posterior extension are less than the normal, and the movements of approximation of the scapulæ posteriorly, and possibly also their rotation, are diminished. Before it is possible to undertake the treatment of a case of kyphosis the existence of all the above-mentioned elements of deformity must be noted, and further, if they are present, they must be investigated to see whether they are correctable by the patient's own muscular power, or only by the exertion of outside force or not correctable at all.

After this preliminary investigation, the case may be classed, as either a purely postural deformity, or else as one in which there are restrictions of certain movements, which restrictions will have to be removed before the deformity can be cured. Even now the investigation is not complete. If a young child with postural kyphosis be told to hold herself up straight, in many cases the result will be to make her throw back her chest and shoulders until they are actually behind the hips, leaving the kyphotic curve as it was, but producing, in addition, a great lordosis in the lumbar region. In a fixed kyphosis there is also often present this excessive lumbar curve, not however fixed, but postural, and corrected as soon as we have cured the kyphosis. The presence of this lordosis must be noted from the first, and also we must note whether the child has any power of voluntarily correcting her kyphosis without producing such lordosis, such power only comes when there is considerable control over the muscles and indicates that the kyphosis should be curable with considerable ease.

I shall presume that any accessory causes of kyphosis,

such as defective vision, particular work necessitating stooping or general ill-health, have been looked for and remedied, and I propose now to deal only with the treatment of kyphosis by remedial exercises.

FIG. 1.



Kyphotic child in her ordinary attitude and in the attitude assumed when she was told to hold herself up straight. The muscular control was very poor.

The methods to be used in the treatment of kyphosis can then be grouped according as they consist of stretching movements, which will eventually render possible those movements which are at first restricted; these I shall refer to as stretching exercises, and into active movements. The latter may be further subdivided according as their effect is to increase the

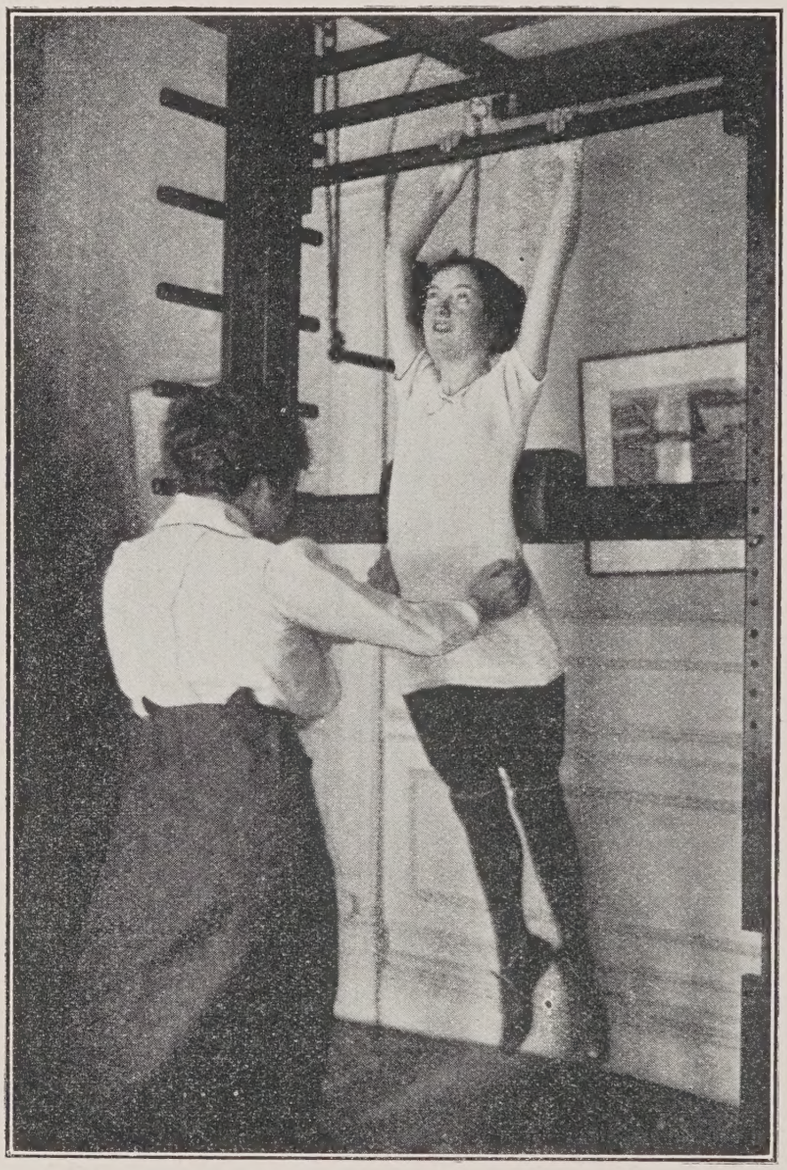
strength of the muscles or to improve their control. Yet this division cannot be made absolute ; comparatively few exercises have a single action. I shall endeavour to show how stretching movements can be included in active exercises, and that all sorts of active movements can be utilised to improve co-ordination, balance, and posture. But the three principles, of stretching, of strengthening and of improving control ought to be in our minds throughout the treatment, and we should also remember the necessity for including treatment for the neck, the scapulæ, the shoulders and the spine, bearing in mind the need to guard against a correction of the kyphosis by the production of a hollow back.

Taking first the posture of the head, this is often purely secondary, the patient being able to draw in the chin and straighten the neck by a voluntary effort, but in very many cases there is some stiffness of the cervical region or cervico-dorsal junction, and until this is overcome the kyphosis will not be cured. The chief passive movement to be employed here is head-rolling. The difficulty met with in carrying this out is that of fixing the dorsal spine and shoulders. The usual method adopted is to encircle the boom with one arm ; another, and perhaps a better method, is to sit the patient with her back to a ladder, which is grasped with the hands in the backward-stretched position. Much can be done to stretch the neck by active movements, flexion, extension, side-bending, twisting, and rolling being employed. In these the spine can be fixed up to the shoulder level by using a hanging position, or arch hanging. As in all active exercises, the accuracy with which the movements are carried out is all-important. If, for example, head backward bending is carelessly performed, the movement takes place entirely in the upper part of the spine, at the occipito-atlantal joint, and no correction in the cervical spine itself takes place. The first part of the movement must be a flattening of the whole cervical spine, the chin being drawn in strongly; only when this movement can be carried no further should the head be tilted backward. When carried out in this way this movement illustrates well the impossibility of separating exercises from each other, for this drawing-in of the chin is inevitably accompanied by a flattening of the whole dorsal spine and a readjustment of the balance of the body. Before leaving the question of neck posture, I must refer to suspension by the head. This has a most powerful effect upon the neck ; it is not a dangerous exercise, even when carried out in a Sayer's sling, but if anyone is afraid to carry it out by this method, it

may be quite well and quickly accomplished by lifting the patient from the sitting posture with the hands placed beneath the mastoid processes and the jaw.

Most of the exercises which stretch the dorsal spine act at the same time upon the scapulæ and shoulders, the arms being

FIG. 2.

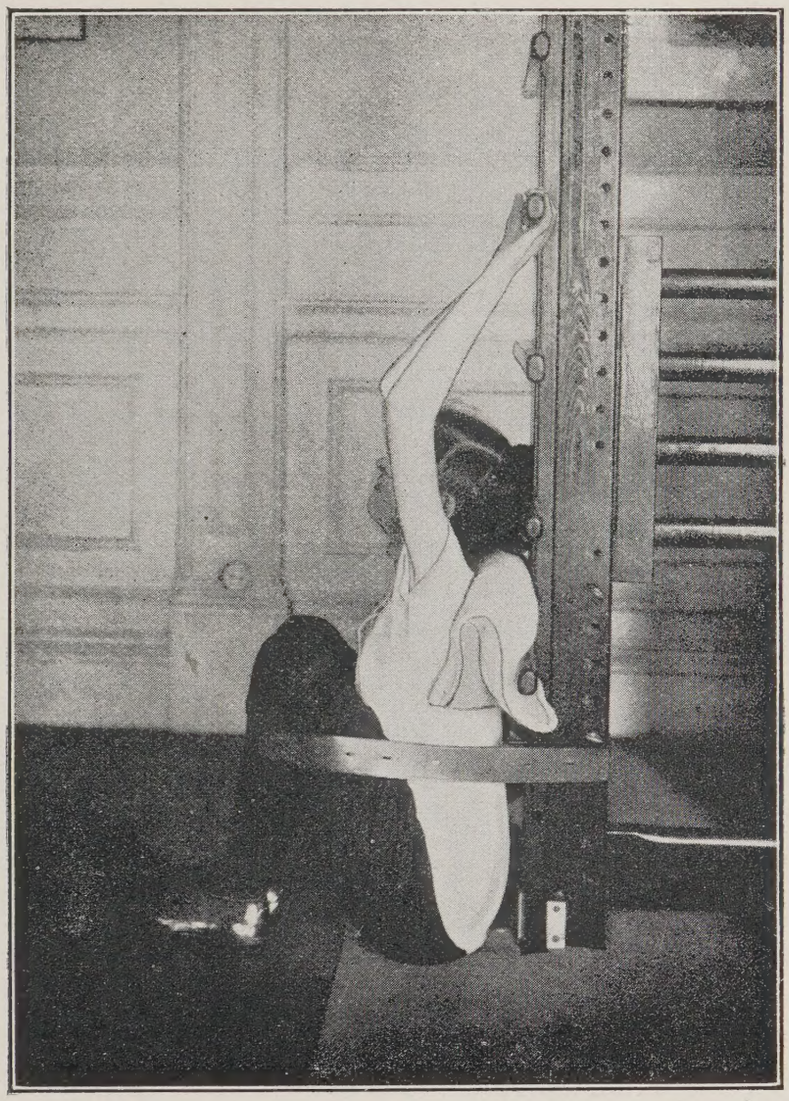


Forcible correction of kyphosis by pressure against the boom in the hanging position.

used for the application of counter pressure. It is in these exercises that the correction of the curve in the dorsal region by the production of a lordosis has specially to be guarded against. One of the simplest of methods of stretching the dorsal region in kyphosis is by hanging with the back against a boom, the body being then forced backwards. Very great pressure can be thus brought to bear upon the kyphotic curve, but if the lumbar spine is mobile, a good deal of the movement

will take place there. In order to get over this a similar exercise may be devised in an attitude in which the lumbar region is fixed, so that lordosis cannot be produced. The simplest method, and a very efficient one, is to place the patient in the long sitting position ; by this means the pelvis is tilted forward by the tension on the hamstring muscles, so that its

FIG. 3.



Forcible correction of kyphosis with the hips fully flexed to prevent the production of a lordosis.

inclination is diminished ; as a consequence the lumbar spine is to a large extent fixed in a partly flexed position. So that long sitting, with arm stretching upwards and pressure upon the dorsal spine, will stretch out a kyphosis without any possibility of producing lordosis. Another more drastic method of abolishing lordosis is by strapping up the patient to a ladder with the hips and knees fully flexed ; the arms are then stretched upwards, and pressure made against the kyphosis.

These exercises are all carried out in the stretch position or hanging ; in these positions the range of movement of expansion and contraction of the chest is diminished, so that they must be combined with definite chest expansion movements which will in almost all cases also act as stretching movements for the kyphotic curve.

Another defect in these movements is that they are purely passive stretching movements. Now a very little active movement is worth a great deal of passive correction, and it is altogether a mistake to believe that active movement cannot have a stretching effect. It is perfectly possible to get a great deal of stretching done by the patient's own effort, the muscles or the weight of the body being used as the correcting force. When passive correction is carried out, the patient in fear of being hurt, involuntarily resists, and in so doing both hinders the correction and uses and strengthens those muscles which oppose the *correction.* Therefore any stretching which can be carried out by the patient himself is doubly or trebly valuable. Upon this point I should like to read you the words of Dr. Andry, the first writer (in 1741) upon the subject of orthopædics. Speaking of the correction of a crooked neck he says—

"When the Hand is employed to turn the Head of the Child to one side, it is only the Effort of the Hand that does the Affair. But this Force is foreign, and consequently not so effectual because it is not seconded by any Effort of the Child. It is the Effort of Nature that ought to do all this. It is this internal and secret Energy that gives the Course to the animal Spirits. While, on the contrary, when the Hand performs the Motion, the animal Spirits of the Child do not act, neither do the muscles contract of themselves, but the motion which you give them is quite passive on their part, and consequently must be of very little service ; for in this Case all ought to come from within."

Whatever we may think of the author's explanation of the reason for the value of active correction, the fact remains undeniably true. Two examples of methods of actively stretching a kyphotic curve will suffice. The simplest is to hang upon one boom, with a second boom against the dorsal spine, and then to swing backwards and forwards, every backward swing will stretch the kyphotic curve, and the stretching so carried out, though passive, will be carried out by the patient's own effort. The second is to sit in the long sitting position, with the buttocks well back against a ladder, which is

grasped with the hands in the stretch position. The head is then bent backwards and an endeavour made to lift the dorsal spine away from the ladder. By this method the correction is active, being carried out entirely by the patient's own muscular power.

I now come to active exercises for the kyphosis, the chief effects of which are actively to correct the curve and to strengthen the erector spinæ muscle. As an example of these,

FIG. 4.

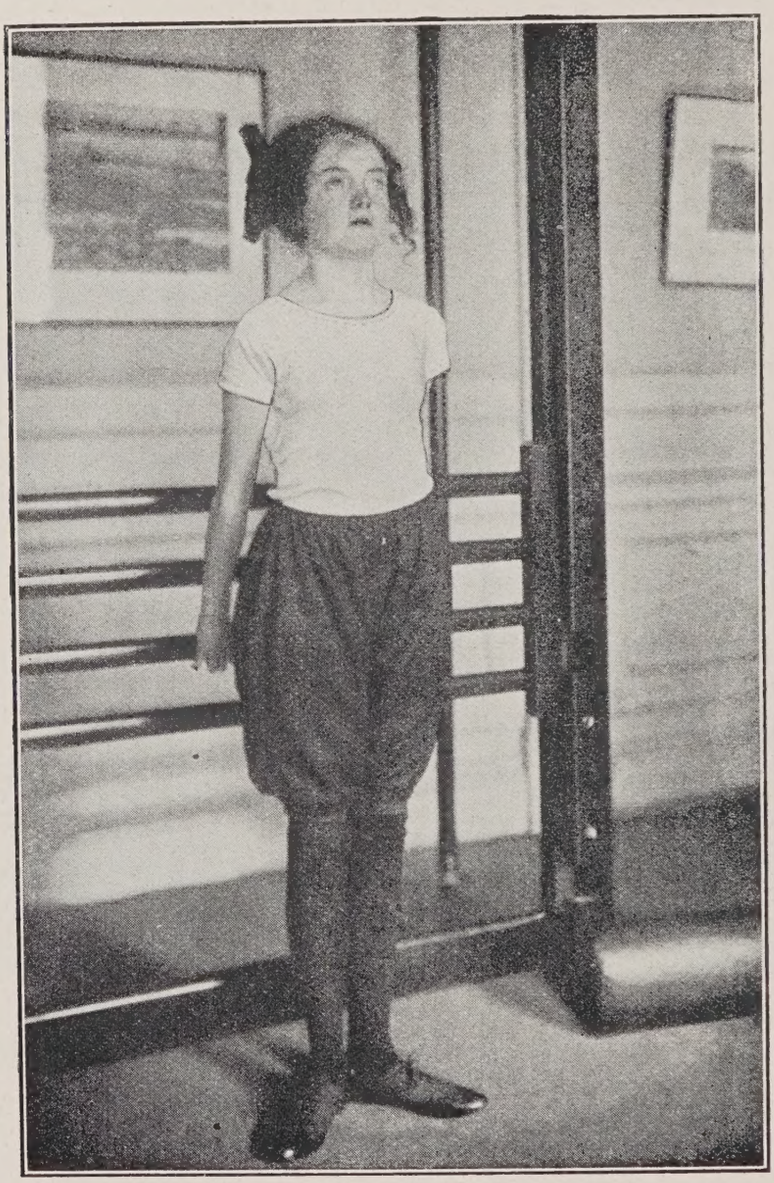
Active correction of kyphosis by lifting the dorsal spine away from the ladder; lordosis is prevented by the fixation of the pelvis brought about by the long sitting position.

exercises in the forward lying position may be quoted; their mode of action is so obvious as to require no further elaboration.

One of the most important groups of exercises for kyphosis is that which includes stretching movements for the shoulders and forcible or assisted chest expansions. It is fair to claim that in a large proportion of cases of what is apparently a postural kyphosis, *i. e.* there is no rigidity of the spine itself, the real difficulty in the way of obtaining an habitual erect attitude consists in the position of the shoulders, and until these have been freed and rendered more mobile it is hopeless to

expect a real cure. On account of the connection between the humerus and the front of the chest through the pectoral muscles, and the frequency of some contraction of these, attempts to loosen the shoulders inevitably affect the expansion of the chest also, so that these two items may be considered

FIG. 5.



Position in which the range of expansion of the chest is greatest.

together. The range of expansion of the chest, that is the difference between the measurements at the extremes of inspiration and of expiration, varies greatly in different positions, the variation being chiefly due to the position of the arms, and the degree to which the upper part of the chest is fixed by means of the shoulder muscles. In measurements upon myself the greatest range of movements was obtained in

the standing position, with the arms stretched slightly backwards, internally rotated and holding a bar, in this position my movement ranges from 35 in. to 38¾ in., forced inspiration being possible by means of the shoulder muscles, the arms being fixed. In the standing or lying positions without holding the movement ranged from 35 in. to 38 in. If, however,

FIG. 6.

Forcible chest expansion with arms rotated out and pressure on the dorsal spine.

the arms are rotated out, the range was only from 35¼ to 37¾, both inspiration and expiration being imperfect. Standing with the arms stretched upward the movement was from 36 in. to 37¾ in., expiration being evidently incomplete, and in the hanging position it was only from 36½ in. to 37¼ in., a range of only ¾ in. These measurements have been confirmed upon others with approximately the same results. They indicate the importance of regulating the positions in which

chest expansion and breathing movements are carried out, and of including breathing movements in a simple sitting or lying position, or in a position in which the arms are fixed by a simple grasp, in all tables of exercises.

The best methods of stretching the shoulders and of expanding the chest are, I believe, those in which the arms are strongly rotated out, chest expansion in the neck rest and heavy sitting positions may be given as examples. Direct backward pulling of the shoulders may also be used, and any shoulder movement which is less than normal must be carried out.

I now come to the problem of the child in whom there are no remaining restrictions of movement, either in the neck, in the spine, in the shoulders, or in the power of expansion of the chest, but in whom there is still a persistent kyphosis, which may now be called with complete accuracy, postural. A saying of Sir James Paget's to the parents of a child who thus held herself imperfectly is worth quoting, it is—

"She says she cannot hold herself up straight, you say she will not, and the truth is that she cannot will." This exactly expresses the truth, the ability is there, perhaps the will is there, but the knowledge of the method of holding the muscles so adjusted that the best posture is maintained is lacking. The cure must now depend upon education in co-ordination and in balance. The method is, I think, this, first to teach the correct position by careful adjustment so that the child when directed can attain the desired position. Then to give carefully graduated exercises, this position being maintained as the initial position throughout, the exercises being progressed, so that at first it is simple for the child to think of and maintain his attitude, whilst carrying them out, later owing to the increasing difficulty of the exercises, this attention to posture becomes more difficult, and the correct attitude must be kept quite involuntarily. Eventually in this way it will be kept quite unconsciously even when no exercises are being attempted. Of all the exercises which may be used to attempt to secure this involuntary correction of attitude, I believe that balance exercises are the most important and the most effectual.

I have gone in considerable detail into the nature and treatment of kyphosis, not with any intention of attempting to give a complete description of the subject, but with the idea of illustrating the principles upon which, in my opinion, remedial exercises should be based. I have no doubt that among my

audience there will be many who would differ from me in method, but I hope that the principles which I have stated will be generally accepted. I propose now very briefly to enumerate some of the other conditions for which remedial exercises may be used in schools, and then to pass on to the possibilities of carrying on these methods in schools or in school clinics.

Lateral curvature of the spine is a difficult subject, and one which does not lend itself to brief treatment. I have elsewhere given my reasons for differentiating sharply between postural lateral curves in which the deformity can be corrected by the patient's own effort, and in which the spine is anatomically normal, and structural lateral curves in which there is already an anatomical alteration of the spine. The first group, postural curves, include 70 to 80 per cent. at least of the curves found in school children. Briefly stated, they are long curves, extending throughout the length of the lumbar and dorsal spine, usually convex to the left, or else they are short curves to the left in the lumbar region, or to the right in the upper dorsal region ; only very seldom are postural curves double. In them there may be considerable displacement of the trunk to one side of the median line, and considerable deviation of the spinous processes at the centre of the curve, but the curve formed by the spinous processes is never a very sharp one. Rotation of the vertebræ is only very slight, and no rotation persists upon flexion of the spine. The clinical tests for a postural curve are its disappearance when the patient stretches the spine, or when the spine is flexed. The question which the observer has to answer in his own mind is whether the curve is one which could be imitated in a normal spine. If it is the curve is postural, if not it is structural. Structural curves include all those in which the deviation of the spinous processes from the mid-line forms a sharp curve, and all those in which there is any considerable rotation. They may in turn be divided into three groups : (1) Those in which the curve disappears when the patient is suspended or when moderate pressure is made upon the convexity, (2) those in which correction can to a large extent be brought about by lateral pressure through straps or by stretching over a boom, and (3) those in which no amount of force can correct the deformity appreciably.

The treatment of postural curves is evidently a muscular problem. To a small extent there may be stretching to be done. But the chief part of the treatment will consist in exercises designed to improve the control of the muscles, and the balance, to teach a symmetrical habitual attitude. In

structural curves the problem is altogether different. Here we must remember that the spine is anatomically abnormal, by which we mean that the vertebræ are asymmetrically or wedge-shaped, and that the ligaments are possibly lax upon one side, short upon the other. Stretching movements are here essential, and must be carried out with determination. Also, if we are to mould the bones into a more normal shape, and to stretch permanently some ligaments and to enable others to shorten up, this will be more rapidly accomplished if the spine is held in the corrected position between treatments. These are my reasons for advocating the treatment of structural scoliosis by other methods, namely, over-correction by force, and supports fitted in the over-corrected position, as well as by exercises. And these are also my reasons for holding that structural curves are unsuitable for treatment simply in a remedial class in school or in a school clinic, although, of course, the exercise part of the treatment can quite well be carried out in the clinic.

In addition to the antero-posterior and lateral curvatures of the spine, many other defects are capable of treatment by remedial exercises. I may name the following : In the neck, habitual postures such as poking forward of the chin, and holding the head on one side, and stiffness of movement, also sterno-mastoid torticollis, after section of the tendon. In the shoulders, lack of full normal mobility. In the chest, flattening anteriorly, lack of mobility, and sulci. In the hips, particularly deficient flexion, the result of tightness of the hamstrings. In the knees, the slighter degrees of knock-knee. In the feet the condition of rectangular talipes, in which dorsal flexion of the foot is limited to the right angle position, a deformity apparently trivial but having very important results upon the powers of walking, and flat-foot in its slighter degrees—that is to say, in those cases in which the arch of the foot can be reconstructed when the patient rises into the tip-toe position.

It would take me too long to enumerate in detail the methods which may be employed in the treatment of these conditions. I shall mention only as examples the stretching of the hamstrings by exercises in the long sitting position, and of the tendo Achillis in the lunge position ; and as examples of active exercises the effect of tiptoeing movements and of skipping upon the muscles which maintain the arch of the foot.

It will be noticed that I have omitted from my list the condition of lordosis. This I have done because I consider this deformity to be secondary, due to an adjustment of balance,

It may be due to a primary kyphosis, or to a prominent and full abdomen, or to some deformity of the hip-joints. Its cure must depend upon the improvement of the primary condition, and the first step towards curing it will naturally be the discovery of the nature of this primary cause.

In reviewing these many conditions which may be treated by remedial exercises it will be evident that a considerable knowledge and ability is required in the instructor who undertakes the treatment. The analysis of the actual difficulties to be overcome requires considerable knowledge of anatomy, and of the physiology of movement, as well as experience of the methods of teaching exercises and of their difficulties. It is difficult to find these qualities in one person, and I feel sure that the proper method to adopt is to encourage consultations upon such patients between a medical man who has some knowledge of physical training and a physical instructor who has some knowledge of medicine. In the actual administration of the treatment much observation and ingenuity must be exercised by the instructor. The exercises must be varied in accordance with the nature of the difficulty and with the ability and perseverance of the patient. Exercises of all sorts may be required, and as I have endeavoured to point out in considering the treatment of kyphosis, free movements, properly progressed, active self-correcting movements and particularly balance exercises are, in my opinion, very important. For these reasons I consider that the best instructor for remedial work is one who has had a good training and considerable experience in educational exercises. The resources of such an instructor are very much greater, and the detection of the reasons of difficulties met with, and of the proper mode of overcoming them, comes to him more naturally.

It would be impossible for me to lay down any exact rule as to which cases are in my opinion capable of treatment in a remedial exercise class in school, which are suitable for treatment in a school clinic, and which are unsuitable for treatment except at a special orthopædic clinic. These questions must depend upon the nature and fitting of the gymnasium, the training of the teacher, and his ability and resource, and upon the possibility of giving time to individual exercises. Roughly we may make the following division: (1) Certain cases, viz. those in which the deformities are purely postural, can be treated in classes of small size, ten to twelve. These should include only such cases as require little or no stretching movements, for in a class only such stretching as is possible by active

exercises can be carried out. Further, cases which require some special exercises not required by the rest of the class are also obviously unsuited for class treatment. However, although these restrictions appear at first to limit greatly the value of class work, this is not really so, for these slighter defects, particularly those in which there is an habitual posture, due to poor muscular control and to lack of balance, are infinitely more common than are the more severe defects. It may be confidently stated that in every elementary school of moderate size several such classes could be readily formed with great benefit to the children. The question of the use of apparatus in such classes is an important one. It may be said at once that the absence of apparatus places the teacher in a trebly difficult position. A certain amount of stretching by active movements of the spine, of the hamstrings, and of the tendo Achillis can be accomplished without apparatus, particularly if the floor be used for sitting or lying upon, and if the wall be used for pressure, but the presence of ribstools, of a boom and of benches makes all the difference to the ease of devising suitable tables of exercises. The cost of fitting such apparatus in small quantity is a very small item compared with the original cost of the hall or gymnasium, and the room occupied by it is negligible. As a minimum I suggest that for a small remedial class six sections of ribstools, a double boom, and two reversible benches are sufficient.

(2) The second class of case is that for which individual treatment is required. This is a much more costly procedure, for each such case requires the attention of the instructor for about half an hour. By careful arrangement, however, it is possible to take a small class of four to six children, give them a certain amount of class-work, and fit in some individual treatment for each during or after the class. More severe cases, however, must have the undivided attention of the instructor if they are to make good progress. For these cases it is unnecessary to consider the need for apparatus. It is essential, and plinths and vertical bars are desirable in addition to that already named.

(3) Finally, there is the class of children with fixed structural deformities, for whom, as I have already stated, I consider that treatment by remedial exercises can only be a part of the treatment, the rest of which must be carried out by an orthopædic surgeon.

I have already expressed the opinion that the gymnastic instructor, if he is to obtain good results, should have been

trained both in remedial and in educational work. To utilise the ordinary school teacher for this work must be only a makeshift method, and must throw upon the school doctor or whoever organises the class, a tremendous amount of work in attempting first to instruct the instructor. The children must also be properly clothed for the work in a gymnastic costume. I may now, perhaps, be permitted to draw up a scheme of the work which could be organised in elementary schools ; those who are familiar with the system in use in Sweden will see that it closely resembles that which is worked there. In many secondary schools there is already remedial work carried out, particularly in the girls' schools. I believe that this work could also be well organised upon the following lines :

In the first place the school should have, in its gymnasium or hall, the necessary minimum of apparatus already mentioned. The cost of this will not be very considerable. In such a school the children would be examined by the school doctor, special attention being paid to such children as are reported by their teacher as being unable to do their ordinary class exercises well.

Those children selected would then be divided into those considered suitable for special class instruction in remedial exercises, those requiring individual attention, and those with fixed structural deformities. The last class, very small in number, would be referred to orthopædic clinics, in the case of elementary schools to orthopædic departments of hospitals, and for them remedial exercises would only be carried out in school clinics at the request of the surgeon who is treating them.

The first class, those suitable for class treatment, would be formed into small classes of not more than twelve children, and given daily exercise treatment in the school gymnasium. The second class would be treated individually at school clinics ; there would probably not be enough of this second class to necessitate such treatment at every school. They would be collected together either at a clinic in a special building at a treatment centre, or else at one of the school gymnasia. If a school gymnasium is utilised the only additional fittings required are a high and a low plinth, at a cost of £7. If a special clinic is fitted a comparatively small room is sufficient, and a ribstool, small boom with saddle, two plinth stools and reversible bench are all the apparatus required.

The instructor, whether for a class or for individual treatment, should, in my opinion, have had a full training in educational and remedial exercises ; for the class work the

cheapest and I think a quite efficient method is the utilisation of the services of a senior pupil from a physical training school.

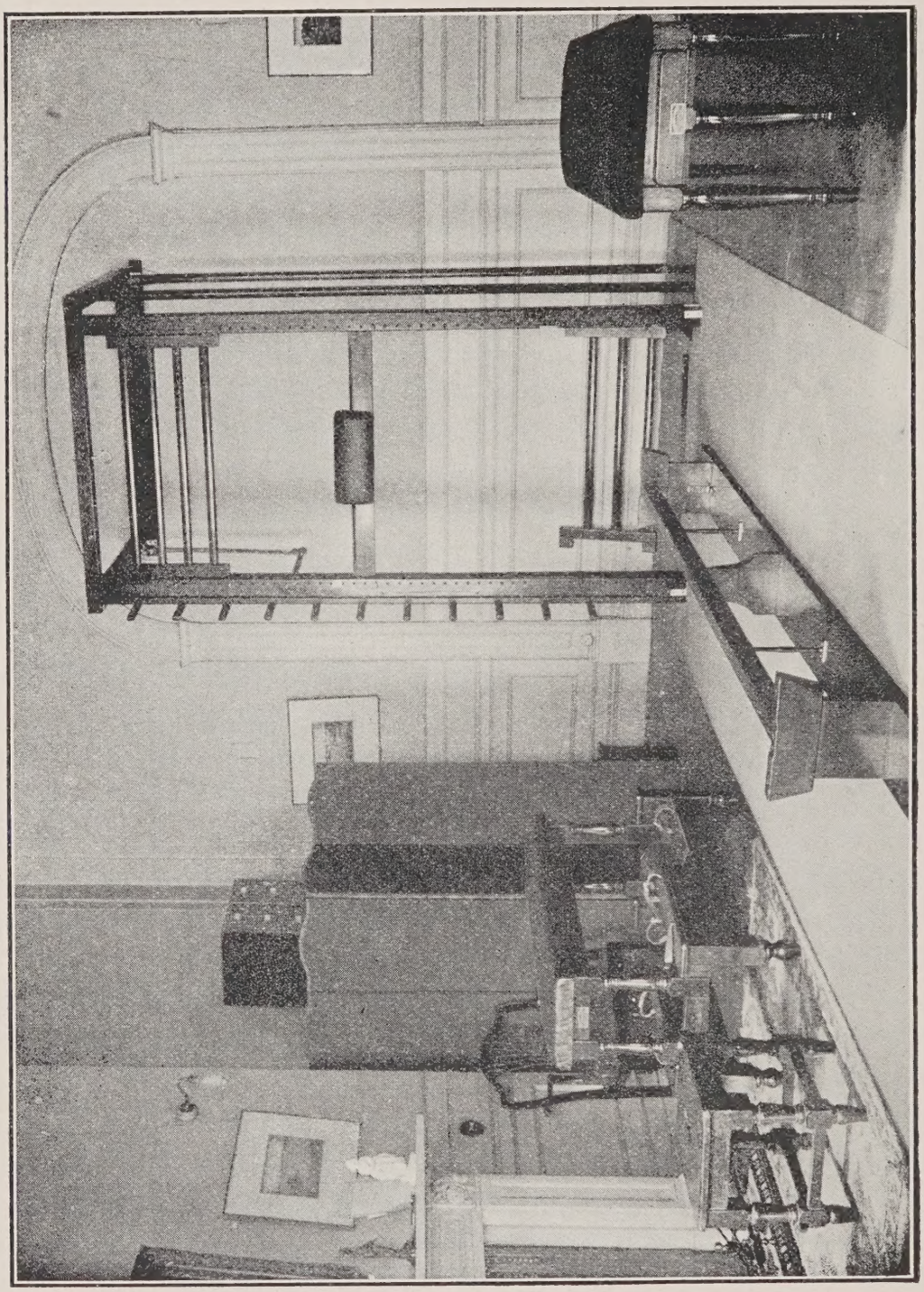


FIG. 7.

Gymnasium, 25 feet by 18, fitted with combination ladders and boom, trapeze, vertical bars, high and low plinth, stool and reversible bench. Sufficient for a small remedial exercise clinic.

In Sweden there are now small remedial classes in the schools consisting of children selected after medical inspection. They are taken, I believe, by senior pupils from the Central Institute and from Arvedson's Training School. Children who require more individual treatment are sent to these institutes for treatment. We are gradually drifting towards a similar system in London, but on account of the absence of fitted gymnasia and

of trained teachers in the London elementary schools, the remedial classes so far arranged in them cannot be considered as a serious attempt to solve the problem.

At St. Bartholomew's Hospital we have now grouped the children attending for remedial treatment into two classes according as they require individual treatment or can be managed in a class. As comparatively few of the children who attend hospital, however, show purely postural curves, many cases of structural curves are treated in classes, and are given in addition some individual exercises afterwards. The classes are of from fifteen to twenty children and are taken by an instructress with several assistants (pupils).

The great difficulty in organising a complete system for London lies in the non-existence of special gymnastic teachers, and of gymnasia. But a great deal could be done upon comparatively economical lines by utilising the services of the pupils in the schools of physical training. Most of this work can be carried out by women, and there is a very fairly sufficient supply of women being trained. It may be claimed that the present remedial classes in London schools are doing good. This is no doubt true, but it must be remembered that one of the chief classes of children requiring remedial exercises consists of children whose physical education has been neglected, and this class is likely to be benefited by comparatively inexpert treatment. The simplest way to economise upon remedial gymnastics will be to improve the system of educational gymnastics. The number of children requiring remedial treatment will thereby be very greatly reduced. The teaching of school gymnastics is a career in itself. It requires a long training, two years at least, and the suggestion that this subject should be taught by an ordinary school teacher who has received a short special training does not seem a rational one. There is plenty of work in a single large school for a special gymnastic teacher, working her whole time. And if there is not, there ought to be no difficulty in arranging for teachers who visit several schools. Such teachers if properly trained, and if they work under medical supervision, could carry on remedial exercise treatment in school gymnasia or in school clinics also.

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